FY2007: National IOOS Development

NOAA initiated a competitive funding process in 2007 to continue building capacity for regional ocean observing systems towards three long-term outcomes; establishing coordinated regional observing and data management infrastructure, developing applications and products for regional stakeholders, and establishing regional and national data management and communications protocols. These projects are contributing to these outcomes.

NATIONAL CROSS-CUTTING IOOS DEVELOPMENT

In addition to the 20 projects funded in FY2007 to support regional IOOS development, the six projects below represent a broad scope of technical support that will service all regions by contributing fundamental research, analysis, and communications that expand the foundation for National IOOS. The total FY2007 investment for these projects is $3,198,268.

Project Title:

An OPeNDAP/OGC Gateway to Support Regional IOOS Interoperability

Recipient/ Lead Principle Investigator:

OpenDap, Inc./Daniel Holloway (*d.holloway@opendap.org*)

Cost:

funded: - $368,116

proposed (subject to available funds): Year 2 - $362,168 Year 3 - $371,812

Performance:

Investigators will build OPeNDAP gateways to two Open Geospatial Consortium (OGC) data protocols – Web Coverage Service (WCS) and Web Feature Service (WFS). Two communities of users will be targeted: the Integrated Ecosystem Assessment resource manager and resource managers and data providers associated with several of the regional associations. As with all OPeNDAP software the resulting source code will be made freely available to the community. Specifically, investigators will address needs of NOAA's Integrated Ecosystem Assessment (IEA) program, with IEA managers serving as the data users and the Pacific Fisheries Environmental Laboratory (PFEL) IEA archive and regional IOOS archives serving as the data providers. In addition to collaboration with NOAA's IEA program, investigators will also collaborate with participants in two regional associations (CenCOOS and MARCOOS) to provide GIS access via OGC services to data products from these associations with particular emphasis on CODAR-derived surface current fields. The gateways to be developed will be documented and made freely available to other regional associations. And as with all OPeNDAP software the resulting source code will be made freely available.

Schedule:

Year 1

- Design of WCS interface
- Plan workshop for community feedback on data model issues
- Design of WFS interface
- Beta version of the WCS interface, with support for netCDF-CF WKB and native IOOS: complete Response Handler for WCS, module for the OLFS, and AIS Response Handler
- Write ontology that allows for translation between OPeNDAP/CF and WCS

Year 2

- Formal release of the WCS interface.

- Write ontology for translation between OPeNDAP/DAPPER and WFS.
- Beta version of the WFS interface, with support for netCDF-CF: (a) build an extension to the WCS module in the OLFS for WFS; (b) add support for HDFEOS by writing an Aggregation Response Handler an HDF-EOS Format Handler; and (c) develop a DDX to GML Schema module for the BES
- Formal release of the WFS interface.
- Revised version of WCS gateway.
- Host a server installation and configuration workshop.
- Extend the Aggregation Response Handler so that it can work with the file types and organizations that are commonly found in situ data collections

Year 3

- Complete all ontologies
- Final version of WCS gateway.
- Revised version of WFS gateway.
- Document ontologies and servers
- Final release of WFS gateway
- Final report

Project Title:
IOOS Observation Registry: Data Network Node Visualization

Recipient/ Lead Principle Investigator:
Monterey Bay Sanctuary Foundation/Josh Pederson (*josh.perderson@noaa.gov*)

Cost:
funded: - $194,065
proposed (subject to available funds): Year 2 - $157,265

Performance:
The primary objective is to enhance the registry infrastructure to better serve regional coastal ocean observing systems (RCOOSs). Work will be performed under the guidance of a technical advisory committee (TAC) composed of coordinators and data managers from regional associations of the IOOS (RAs) and NOAA managers The role of the TAC will be to advise development of the registry to ensure that needs of RCOOSs are being met and that the evolution of the registry continues to align with data management standards of IOOS. Enhancements will include the interactive sensor platform map, online observation record builder, and XML harvest feature (XML, or Extensible Markup Language is a flexible way to create common information formats and share both the format and the data via the World Wide Web and elsewhere). The map, which shows the locations of observation platforms inventoried in the registry and is refreshed on a 24-hour interval (http://oceanobs.org/wc/map), will be expanded to provide a finer level of analysis and planning of observation platform locations. The functionality and feature-set of the online observation record builder will be enhanced to better facilitate creation of registry XML records for data providers. The XML harvest feature, which 'ingests' observation record files posted by RCOOS data providers, will be expanded to ensure data flowing into the registry is valid. Other objectives include securing a long-term server platform to host the registry, implementing an off-site back-up system to ensure redundancy, and creating complete technical documentation of the IOOS Observation Registry system. All work will be defined and

prioritized at a TAC workshop hosted by SIMoN early in Year 1 of the project. Year 1 objectives are to improve public access for queries and interactive functionality; secure a scalable, robust host server; and establish a redundant back-up system.

Schedule:

Year 1

- Host Technical Advisory Committee workshop
- Secure server platform
- Complete sensor map changes
- Complete observation record builder changes
- Establish system back-up at University of South Florida

Year 2

- Document standards integration options
- Complete XML harvest changes
- Refresh USF back-up system
- Publish technical documentation

Project Title:

Standards Integration of QA/QC Requirements for Oceanographic Observing Systems

Recipient/ Lead Principle Investigator:

Woods Hole Oceanographic Institution/Dr. Janet Fredericks (*jfredericks@whoi.edu*)

Cost:

funded: - $286,087

proposed (subject to available funds): Year 2 - $276,808 Year 3 - $286,437

Performance:

With support from NOAA, a grass roots organization called QARTOD (Quality Assurance in Real Time Oceanographic Data) has met regularly over the past few years, working towards the definition of minimum requirements in QA/QC in four focus areas: waves, in situ currents, CTD and dissolved oxygen. Investigators will supplement the ongoing QARTOD activities by demonstrating an implementation of the QARTOD results. For each focus area, investigators propose to define and document the QA/QC requirements, as they relate to Open Geospatial Consortium (OGC) standards, in particular the Sensor Web Enablement initiative. With these requirements, the development team at University of Alabama, Huntsville (UAH) will prepare a common data model, providing data dictionaries and defining relevant profiles in SensorML. WHOI and NCDDC will coordinate the data dictionary content development between the QARTOD and observing system community members and the data model development at UAH. The data model, dictionaries and profiles will be reviewed by focus area experts (researchers), as well as representatives from data centers (data providers) to confirm that a functional and feasible model has been developed. Once the model is finalized, the development team will design any required methods and work with WHOI and NCDDC to generate a tutorial for implementation of the SWE standards for the QA/QC of the focus area (e.g., waves). The UAH team will also provide associated XML-generating tools that evolve for the generation of QA/QC templates for each of the focus areas, facilitating implementation by participating data providers.

Local data providers will implement the QA/QC standards, as defined within this project through the OOSTethys Sensor Observations Service (SOS), maintained by the Gulf of Maine Ocean Observing System (GoMOOS) as part of a relatively broad community activity involving the Southeastern Universities Research Association (SURA) and the Marine Metadata Interoperability (MMI) project. Other OOSTethys participants will be informed of the capabilities through the Cookbooks and Best Practices documents being developed on their site (www.oostethys.org), and encouraged to participate through travel support requested in this proposal. The deliverables will be made publicly available through the MMI web site (www.marinemetadata.org) and open source software implementations and cookbooks through www.oostethys.org.

Schedule:

Year 1

- Develop common data model profile for ocean observation data and wave observations data
- Develop/review/test methods, tools and tutorial on implementing wave data profile
- Draft and approve specifications for qualifiers, parameters, and methods of QA/QC for wave observations for use in SensorML data model
- Meet with wave experts/researchers
- Meet with OOSTethys representatives and select data providers
- Announce product to the broader community before

Year 2

- Meet with *In Situ* Current experts
- Develop common data model profile for *In Situ* current observation data
- Draft/approve specifications for qualifiers, parameters, and methods of QA/QC for *In Situ* current observations for use in SensorML data model
- Develop/review/test methods, tools and tutorial on implementing the *In Situ* current data profile
- Meet with subset of oceanographers and OOSTethys representatives and select data providers
- Announce product to the broader community before March 2010

Year 3

- Meet with CTD and Dissolved Oxygen experts
- Develop common data model profile for CTD and DO observation data
- Draft/approve Specifications for qualifiers, parameters, and methods of QA/QC for CTD and DO observation data for use in SensorML data model
- Meet with subset of oceanographers and OOSTethys representative and select data providers
- Develop/review/test methods, tools, and tutorial on implementing CTD and DO profiles
- Finalize all tutorials and tools
- Announce product to the broader community before January 2011

Project Title:

Alliance for Coastal Technology (ACT)

Recipient/ Lead Principle Investigator:

University of Maryland Center for Environmental Science – Chesapeake Biological Lab/Mario Tamburri (tamburri@cbl.umces.edu)

Cost:
funded: - $1,100,000
proposed (subject to available funds): Year 2 - $3,000,000 Year 3 - $3,000,000

Performance:
The Alliance for Coastal Technologies (ACT) is a NOAA-funded partnership of research institutions, resource managers, and private sector companies dedicated to fostering the development and adoption of effective and reliable sensors and platforms. ACT priorities include transitioning emerging technologies to operational use rapidly and effectively; maintaining a dialogue among technology users, developers, and providers; identifying technology needs and novel technologies; documenting technology performance and potential; and providing the Integrated Ocean Observing System (IOOS) with information required for the deployment of reliable and cost-effective networks. To address these priorities, ACT provides three fundamental services: (1) Third-party test bed for quantitatively evaluating the performance of new and existing coastal technologies in the laboratory and under diverse environmental conditions, (2) Capacity building through technology specific workshops that review the current state of instrumentation, build consensus on future directions, and enhance communications between users and developers, and (3) Information clearinghouse through a searchable online database of environmental technologies and community discussion boards.

Schedule:
Year 1

- supporting the NOAA National Data Buoy Center and U.S. Army Corps of Engineers in the development of an IOOS Operational Waves Observation Plan
- completing the ACT Technology Evaluation of in situ nutrient analyzers
- initiating Technology Evaluations of in situ salinity sensors (an IOOS core variable) and in situ pCO2 sensors (to address ocean acidification)
- holding a series of Technology Workshops on topics such as Biological Platforms for Environmental Sensors, Hydrocarbon Sensors for Oil Spill Response, and Environmental Sensing for Port Security

Years 2-3 (examples)

- sensors for public health risks demonstration/workshop(s)
- sensors for environmental for port security demonstration/workshop(s)
- sensors for indirect measures of ballast water management/workshop(s)
- roadmap for future design/fabrication requirements for ocean and coastal buoy technology

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Project Title:
The SURA Coastal Ocean Observing and Prediction (SCOOP) Program

Recipient/ Lead Principle Investigator:
Southeastern Universities Research Association/Jerry Draayer (draayer@sura.org)

Cost:
funded: Year 1 - $1,000,000

Performance:
Sustained data flow from a coordinated system of ocean observations, and the predictions enabled by those data, will provide the U.S. with the capability to protect life and property, to respond effectively to natural disasters, to manage resources, and to address economic and societal needs now and in the future. The Southeastern Universities Research Association (SURA) is advancing the SURA Coastal

Ocean Observing and Prediction (SCOOP) program as a multi-institution and multi-state collaboration to design and test a modular, distributed system for real-time prediction and visualization of the impacts from extreme atmospheric events, including hurricanes and waves. The SCOOP program goals include data integration and interoperability and support key objectives of the Integrated Ocean Observing System (IOOS).

The objective of the ongoing program in the coming year is to create, consolidate and document a set of standard software examples from the existing SCOOP infrastructure components (these include various numerical models, a metadata catalog, archives, web-service interfaces, representative data sets, etc.). These will serve as concrete examples to help others implement their own versions of similar components, for their own uses and/or for contribution to the community infrastructure. These software examples (in the form of a shared source-code) will be held in an openly accessible software repository. SCOOP will also maintain working end-to-end prototypes of these examples. This will achieve sustained value to the IOOS community by creating an open-access community cyber infrastructure that can leverage other projects and grow in an incremental fashion.

Project Title:
The National Ocean Economics Program

Recipient/ Lead Principle Investigator:
Monterey Bay Aquarium Research Institute/Judith Kildow (jtk@mbari.org)

Cost:
funded: Year 1 – $250,000

Performance:
The National Ocean Economics Program (NOEP) produces and distributes data on Human Observations of our nation's coasts and oceans. It provides a full range of the most current economic and socio-economic information available on changes and trends along the U.S. coast and in coastal waters. The program is funded by federal, state, university, and private grants and contracts. The purpose of the NOEP is to: (1) compile a comprehensive time series of socio-economic indicators revealing the economic value of the ocean and coasts of the United States; (2) define and describe the Ocean and Coastal Economies, (3) reveal changes and trends in uses and values of coastal and ocean resources, 4) link changes in human activities and changes in the ocean environment that demonstrate the relationships among them . A primary objective of the NOEP is the creation and distribution to the public of a spatially and temporally consistent data set that will support a wide range of economic, scientific, and resource management activities. (www.OceanEconomics.org) A second objective is the development of selected derivative products designed to demonstrate the utility of the primary data set. NOEP outputs comprise both market and non-market indicators of the value of ocean and coastal industries and the resources that depend on them, provide natural resource values and production levels, and incorporate key indicators of the human activities that depend upon and influence ocean and coastal resources.

NOAA Contacts:

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